

1 **“MODULAR STACKABLE FENCE APPARATUS”**

2 FIELD OF THE INVENTION

3 The invention relates to fence structures formed from modular
4 assemblies and more particularly to modular fence assemblies that can be stacked
5 for transport.

6 BACKGROUND OF THE INVENTION

7 It is known to provide perimeter fence structures around installations
8 such as an oilfield drilling site or wellhead. The perimeter fence must effectively
9 prevent animal encroachment, particularly by cattle, as many of these installations
10 are found on agricultural range land.

11 Cattle are known to rub against conventional fencing, such as wire or
12 wire mesh panels having vertical posts. Over time, the constant rubbing results in
13 damage and disruption of the integrity of the fence.

14 Further, modular fence structures are typically moved from site to site
15 such as when drilling ends or wells no longer produce. Thus, it is of some
16 considerable importance that the perimeter fence structures are modular and are
17 easily transported in conventional pickup trucks or on towed trailers. Onsite, access
18 to the enclosed installation may be required by large equipment such as service rigs.
19 It is advantageous if the fence assemblies are readily connected and disconnected
20 from each other to provide access when required.

21 As many drilling sites are located in areas which are subject to below-
22 freezing ambient temperatures, it is also important that the modular assemblies used
23 to create the perimeter fence are not secured to the ground in such a fashion that

1 the fastenings become frozen into the ground. Removal of frozen fastenings often
2 results in damage to both the fastenings and to the fence assemblies.

3 US Patent 5,533,714 to St. John teaches a modular fence apparatus
4 for use in constructing a perimeter fence to prevent entry of animals and cattle into
5 the fenced area. The fence apparatus comprises flat panels with span members.
6 The flat panels are connected to discrete corner assemblies that are angled so as to
7 set each panel at an angle. The panels are angled inward along a top edge. Further,
8 the corner assemblies have span members connected between frame members to
9 form triangular angled corner panels. While the flat panels are easily stacked for
10 transport, the corner assemblies, which comprise three upright posts, 2 angled top
11 members and the span members, are awkward and not readily stacked. Each flat
12 panel must be connected at each end to a corner assembly using fasteners when
13 the perimeter is assembled and similarly, fasteners must be removed to gain access
14 for large equipment or for disassembly. If the perimeter fence is required to be other
15 than rectangular, separate corner assemblies would be required having various
16 preset angles.

17 Canadian patent 1,091,968 to Hillman teaches a perimeter fence
18 having generally vertically disposed rigid post members which have a lower portion
19 that engages the ground and an upper, inwardly inclined portion to which the rails
20 are attached. At least one of the rails is disposed at the height of the average bovine
21 knee to prevent leaning or rubbing. Rails, extending at right angles to the corner
22 posts, are welded or otherwise fastened to the corner posts. The rails are split mid-
23 span and connected by welding, by removable fasteners or the like. Clearly,

1 assembly on site requires significant time and effort. If formed as modules having
2 the rails pre-welded to the corner posts, each module is relatively large and
3 cumbersome. Transport of the modules would be awkward and the number of
4 modules that could be transported at any one time may be limited. As with the
5 perimeter fence of St. John, changes in the shape of the fence would require
6 welding the rails to the corner posts at a variety of angles, necessitating on-site
7 assembly or stocking of a number of different modules.

8 Clearly, what is required is a modular fence assembly that can be
9 readily stacked for transport in a truck bed. Further, the modules should require a
10 minimum of assembly on site and allow for forming a perimeter fence of whatever
11 shape is required for each unique location. Preferably, the fence should be easily
12 opened for access to large equipment such as a service rig.

SUMMARY OF THE INVENTION

A fence module for forming a perimeter fence is provided. The fence module has two end assemblies connected by span members. The end assemblies comprise a vertical member connected at a lower end to a first end of a horizontal member and an angle arm connected between an upper end of the vertical member and a second end of the horizontal member. The angle arm is connected to a side edge of the vertical and horizontal members to permit sufficient space to allow successive fence modules to be stacked for transport and storage.

In a preferred embodiment of the invention, a spacer means is positioned between the angle arm and the vertical and horizontal members to provide additional tolerance resulting in the ability to stack large numbers of fence modules without restriction.

Successive fence modules are readily fastened to each other for forming a perimeter fence, without the need for additional structural elements. Attachments means, preferably loops, are spaced along the vertical members of the end assemblies. Preferably the loops on a second end support of a first fence module are spaced to co-operate with the loops on a first end support of a subsequent fence module to permit vertical alignment of the loops to allow passage of a pin therethrough. Thus, the fence modules are pivotally attached to one another and rotation about the pin allows the fence modules to be arranged at infinite angles permitting forming perimeter fences having a number of polygonal shapes.

1 BRIEF DESCRIPTION OF THE DRAWINGS

2 Figure 1a is a perspective view of one embodiment of a fence module
3 of the present invention assembled into a rectangular perimeter fence;

4 Figure 1b is a perspective view of one embodiment of a fence module
5 of the present invention assembled into a triangular perimeter fence;

6 Figure 2a is a partial side view of a fence module according to Fig. 1a,

7 Figure 2b is a close up view of the detail of the connection between a
8 right angle corner brace and an angle arm according to Fig. 2a;

9 Figure 3 is a partial perspective view of a first fence module pivotally
10 attached to a subsequent fence module illustrating the attachment detail;

11 Figures 4a-c are front schematic views of a plurality of fence modules
12 according to Fig. 1a, illustrating the stackability of the modules, more particularly,
13 Fig. 4a is a plurality of modules prior to stacking, Figs. 4b and Fig. 4c illustrate the
14 relationship between modules as the modules are stacked; and

15 Figures 5a-b, are side schematic views of a plurality of fence modules
16 according to Fig. 1a, more particularly, Fig. 5a is a plurality of modules prior to
17 stacking and Fig. 5b illustrates the relationship between successive right angle
18 corner braces and angle arms as the modules are stacked.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Having reference to Fig. 1a, a perimeter fence 1, formed using unitary stackable fence modules 2 of one embodiment of the present invention, is shown.

As shown in Figs 1a - 3, each fence module 2 comprises two delimiting end supports 3 spaced by a plurality of span members 4 attached therebetween. Each end support 3 has a substantially vertical member 5, a horizontal member 6 connected at a first end 7 to a lower end 8 of the substantially vertical member 5 and an angle arm 9 connected between an upper end 10 of the substantially vertical member 5 and a second end 11 of the horizontal member 6. The end supports 3 act as braces to support the span members 4. The span members 4 are connected at each end to the angle arms 9 creating an upwardly and inwardly inclined fence module 2, suitable for preventing intrusion and damage by animals and livestock. The span members 4 are spaced so as to have at least one span member 4 positioned at about the height of the average bovine knee and at least one span member positioned at about the height of the chest. In this way, livestock are discouraged from attempting to step over the fence 1 and, because of the inward incline, are not inclined to lean or rub against the span members 4.

Further, best seen in Figs. 1a-b and 3, when a first fence module 20 is attached to a subsequent fence module 21, the adjacent end supports 3 act to form a corner 22. The perimeter fence 1 is shown having a square shape (Fig. 1a), however, it will be appreciated by those skilled in the art that adjacent modules 20,21 can be pivoted at the corner 22 and the perimeter fence 1 can be formed in any number of polygonal shapes using three or more fence modules 2 (Figs. 1a-b).

1 As shown in Figs. 2a, 4a-c and 5a-5b, and in a preferred embodiment
2 of the invention, the angle arm 9 is connected to the vertical member and to the
3 horizontal member at inside side edges 12,13 adjacent the span members 4. This
4 arrangement of vertical members 5, horizontal members 6 and angle arms 9 permits
5 stacking of a plurality of fence modules 2.

6 Preferably, as shown in Figs. 2b and 4a-c, a spacer means 14 is
7 positioned between both the substantially vertical member 5 and the horizontal
8 member 6, and the angle arm 9 at points of connection 15 to provide additional
9 dimensional tolerance, permitting a large number of substantially identical modules 2
10 to be stacked without restriction.

11 As shown in Fig. 3, attachment means, such as and preferably loops
12 16, are attached to each substantially vertical member 5 to permit pivotal attachment
13 of the first module 20 to the subsequent module 21. The loops 16 on each of the first
14 and subsequent module are positioned to be aligned vertically to accept a pin 17 to
15 be passed therethrough. Thus the modules 20, 21 can be rotated about the pin 17 to
16 form a corner 22 having an infinitely variable angle for forming different shaped
17 perimeter fences 1.

18 Pins 17 used to attach subsequent modules 20,21 can be of sufficient
19 length to permit penetration into the ground to more securely affix the perimeter
20 fence 1 thereto. While some freezing of the pin 17 into the ground may occur with
21 low ambient temperatures, difficult removal of the pin 17 would result in damage to
22 the pin 17 only and not to the fence modules 2. This is a significant improvement
23 over prior art fence modules where the leg of the module is inserted into the ground

1 resulting in a need to repair the fence module should damage occur when removing
2 the leg from frozen ground.

3 More preferably, each fence module 2 has a first end support 3,23 and
4 a second end support 3,24. The second end support 3,24 of the first module 20 has
5 loops 16 spaced to co-operate with loops 16 on the first end support 3,23 of the
6 subsequent fence module 21.

7 In the preferred embodiment, the end supports 3,23,24 and the span
8 members 4 are formed of tubular steel which are welded to form each fence module
9 2.

10 Additionally, as shown in Fig. 1a, at least one fence module 2 is
11 formed having a man-door or gate 30, intermediate the span members 4, to permit
12 access by personnel at the site. A pair of support posts 31 are positioned
13 intermediate the span members 4 and extend from a top span member 32 to the
14 ground and at an identical angle to that of the angle arms 9. A horizontal base
15 member 33 extends between the support posts 31 at a lower end 34 of each of the
16 support posts 31. The gate 30 is connected to one of the support posts 31 by two or
17 more hinges 33.

18 Large equipment can readily gain access within the perimeter fence 1
19 by removing one of the pins 17 and pivoting one or both of the fence modules 2 to
20 open the perimeter fence 1.